

REPORT CONCERNING
UPGRADING THE DIGITAL PORTION OF
THE HEPC FACILITIES

21 DECEMBER 1971

The Working Group reviewed the Auerbach Computer Technology Reports, Minicomputers, published by Auerbach Info, Inc., Philadelphia, Pennsylvania to obtain the hardware and software specifications of minicomputer manufacturers. These specifications were compared with the requirements in the report "Study of the Need for Upgrading the HEPC Digital Computers". Most of the manufacturers were unable to meet one or more of the requirements, in particular the following three: a) memory cycle time and input device characteristics to sustain the data transfer rate during digitization; b) magnetic tape transport characteristics, i.e., density, velocity, and number of tracks, to sustain the data transfer rate during digitization; and c) system software to provide a foreground/background processing environment such that a minimum of system software programmer time would be required.

After this initial review, a configuration (not detailed but only major components) was generated for each of six candidate manufacturers to obtain a capability versus cost comparison. As a result of this second review, two manufacturers were rated above the others; Datacraft Corporation (DC), and Digital Equipment Corporation (DEC). Two manufacturers, Systems Engineering Laboratories (SEL) and Scientific Control Corporation (SCC), were reviewed as being representative of the other candidate manufacturers.

An exception was made in the case of DEC to the Working Group philosophy that only existing hardware, system software, and installation experience be considered. There were three reasons for making this exception. First, DEC is the largest manufacturer in the minicomputer field with corresponding experience and capability to influence future trends. Second, the Agency has a considerable inventory of DEC equipment and some system and application software experience and competence among staff personnel. Third, DEC recently announced a new model within its PDP-11 line, the 11/45.

Existing PDP lines do not meet two of the requirements, i.e., magnetic tape transport velocity and system software. The currently available tape controller and tape transport would have to be modified to increase the velocity from 45 ips to 150 ips. Two features of the PDP-11/45, i.e., a memory segmentation option and a new version of the system software, Real-Time System Executive, RSX-11 level D, provide the capability for a foreground/background processing environment.

The requirement for a 2.0M byte per second data transfer rate as a minimum is met by both DC and DEC. The desire for a 4.0M byte per second rate cannot be met by DC due to the design of the Automatic Block Controller; however, memory cycle time will sustain this rate (see Appendix I). The 4.0M byte per second rate probably can be met by DEC depending upon the reduction achieved by memory interleaving in their 0.85 μ second memory cycle time (see Appendix II).

Specifications are not finalized for the: a) digitizer interface; b) interface of equipment at an analyst position, i.e., D/A convertor and scope; c) 3 X 2 switch; d) CRT interface; and e) electrostatic printer and other miscellaneous interfaces (see Figure A). Thus, an estimated cost was included for these five categories. There is a difference in the estimated cost in one category, i.e., digitizer interface, and this reflects the degree-of-difficulty anticipated between a 24-bit word and a 16-bit word interface.

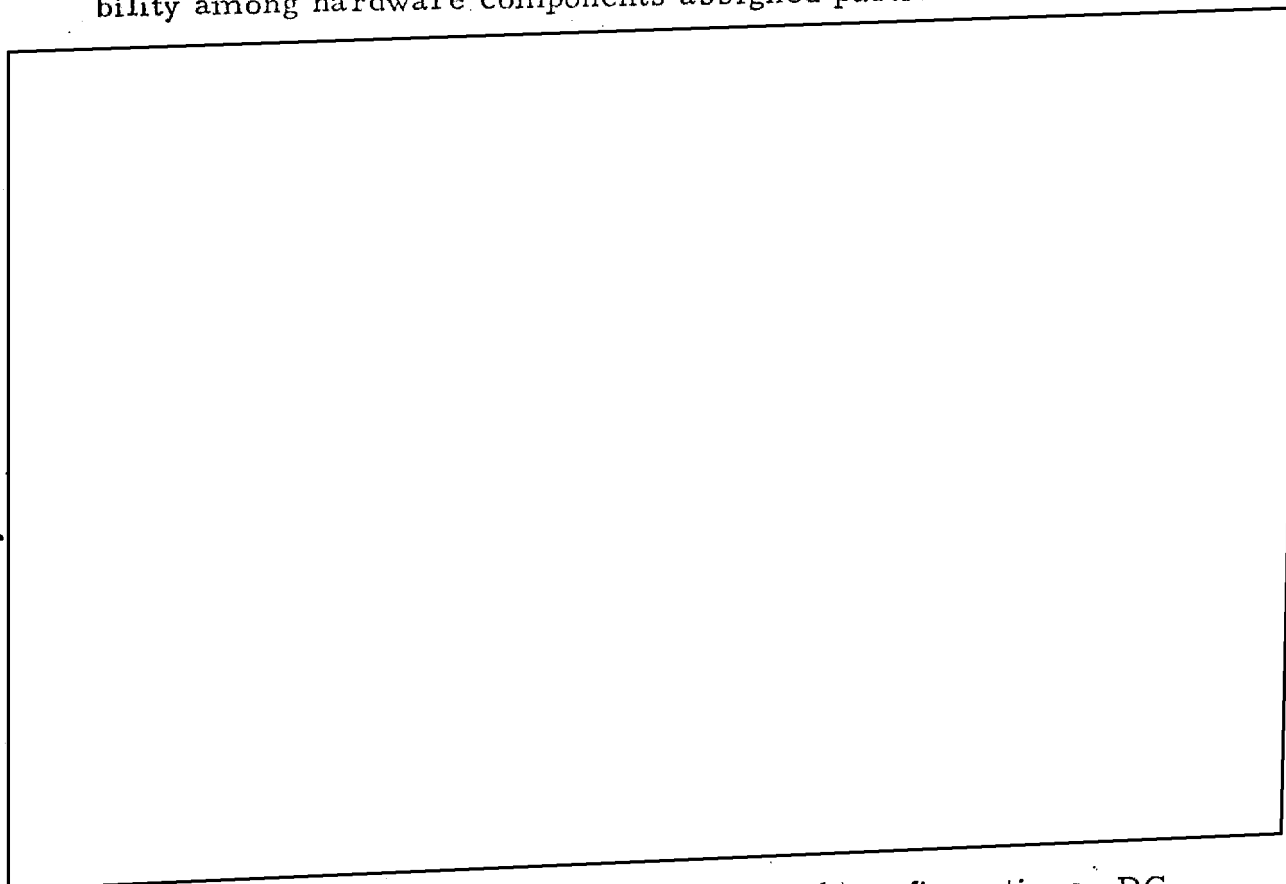
The cost of the electrostatic printer, CRT, and the equipment at an analyst position is not included.

Since DC and DEC were rated above the other manufacturers, recent price lists were utilized. The price list for DC was effective 9 November 1971 and for DEC the effective date was 1 August 1971. For SEL and SCC, price data were obtained from the Auerbach Reports and are approximately fifteen months old and thus probably are higher than current prices.

A detailed configuration was generated for DC (Appendix I), DEC (Appendix II), SEL (Appendix III), and SCC (Appendix IV).

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These configurations reflect an attempt to establish comparability among hardware components assigned particular tasks.



The Working Group believes that both configurations, DC and DEC, provide the capability required by HEPC and that SEL and SCC, as representative manufacturers of the other four considered, do not provide an equal capability.

The PDP-11/45 is scheduled for first delivery during first quarter of CY-1972 and the new version of the system software is scheduled for release during second quarter of CY-1972. Thus, if HEPC desired to install the first minicomputer system, hardware and software, prior to third quarter of CY-1972, it would be a PDP-11/20 not a PDP-11/45. This would entail processing under the old system software for a period of time and then replacing the 11/20 with the first 11/45. This delivery schedule mitigates against DEC to the extent that the Working Group does not recommend the PDP-11/45 even though this system promises more potential.

It is recommended that OEL solicit a proposal from DC which would include the following items:

- a. purchase price of digital configuration and firm delivery schedule,
- b. estimated price for the required hardware interfaces,
- c. maintenance contract for the total system,
- d. lease (rental) contract, either directly or through a third-party arrangement, for a sufficient period to demonstrate total system operation in the HEPC environment.

If a satisfactory proposal is received, it is recommended that one DC-6024 be leased and installed within, and in addition to, the existing HEPC facility. When this minicomputer has been demonstrated to be operational, one of the SDS 910 computers may be released and a second leased DC-6024 scheduled for installation. When the latter has been demonstrated to be operational and the total system to be satisfactory, the second SDS 910 computer may be released, the leasing arrangement terminated, and the system purchased.

It is also recommended that OEL task an independent contractor to provide an estimated price for the required hardware interfaces.

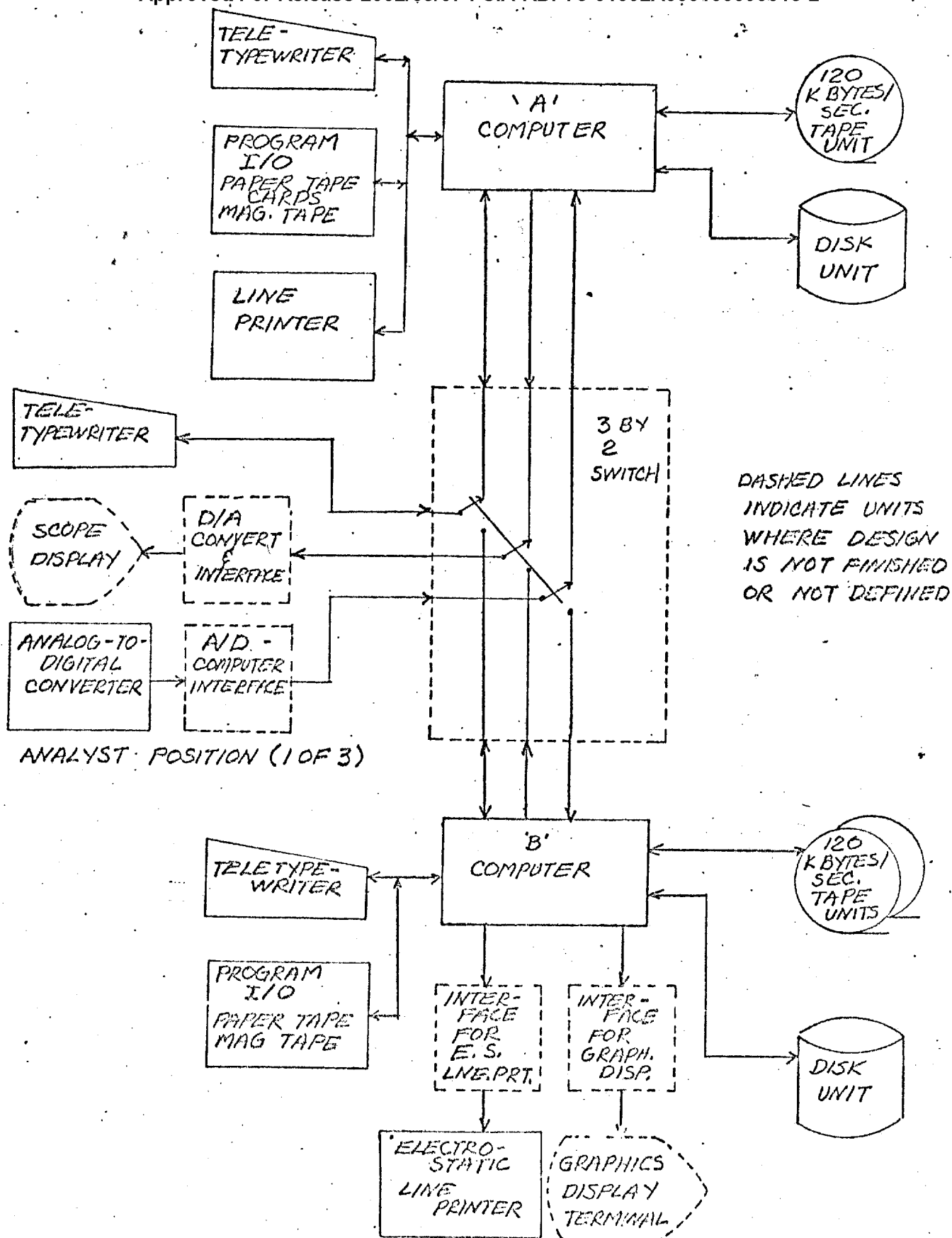


FIGURE A.

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